PATENT SPECIFICATION (11) 1 604 458

1 604 458

(21) Application No. 864/81 (22) Filed 19 April 1978
(62) Divided out of No. 1604457
(31) Convention Application No. 52/045417
(32) Filed 19 April 1977
(31) Convention Application No. 52/045418
(32) Filed 19 April 1977
(31) Convention Application No. 52/045416
(32) Filed 19 April 1977
(31) Convention Application No. 53/023217
(32) Filed 1 March 1978 in
(33) Japan (JP)
(44) Complete Specification published 9 Dec. 1981
(51) INT CL³ G03B 27/32
(52) Index at acceptance
G2A 301 303 304 310 320 C3 C5 EM

(19)

(54) COPYING OR PRINTING APPARATUS

(71 We, CANON KABUSHIKI KAISHA, a Japanese Company of 30-2, 3-chome, Shimomaruko, Ohta-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a copying or printing apparatus which is operable to record an image on an image recording member. More specifically, the invention is concerned with a copying apparatus in which copying in real size or modified size (i.e. reduced or enlarged size) is selectable.

The invention aims to facilitate the procedure of copy anode selection.

According to the invention there is provided a copying or printing apparatus comprising:

image forming means selectively operable in a real size copying mode and a plurality of modified size copying modes to form on a recording medium an image of an original to be copied;

first manually operable means by which selection may be made between the real size copying mode and alternatively the modified size copying modes; and

second manually operable means for the selection of one of said modified size copying modes;

said second manually operable means being arranged to be disabled, whereby modified size copying mode selection is inhibited, in response to the selection, by operation of said first manually operable means, of said real size copying mode.

The first manually operable means may comprise a masking member arranged, in one condition thereof in which the real size copying mode is selected to mask the second manually operable means, and in another condition, in which the modified size copying modes are selected, to expose the second manually operable means to permit selection between the different modified size copying modes.

Means may be provided to cause the mask to revert from its unmasking condition to its masking condition at a predetermined timing, for example upon turning off of the power to the apparatus or upon elapse of a predetermined period which follows completion of an image forming operation of said image forming means in a modified size copying mode, and during which no further image forming operation in a modified size copying mode commences.

In the masking condition, the masking member may visually expose the second manually operable means.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1A is a side view in cross-section showing a first embodiment of a copying, or reproduction apparatus, to which the present invention is applicable;

Figure 1B is a top plan view of the reproduction apparatus shown in Figure 1A;

Figures 1C—A and 1C—B are respectively top plan views of a cassette, in which image transfer sheets are accommodated;

Figures 2A and 2B are respectively top plan views of the operating panel for the reproduction apparatus shown in Figures 1A and 1B;

Figures 3A and 3B are respectively perspective and side-elevational views

indicating a size-reduction operating section in the operating panel shown in Figures 2A and 2B;

Figure 4A is also a perspective view of a different embodiment of the size-reduction operating section;

Figure 4B is a circuit diagram for such size-reduction operating section;

Figure 5 is again a perspective view of a further embodiment of the size-reduction operating section;

Figure 6A is a first embodiment of the circuit diagram for the first reproduction apparatus;

Figure 6B is also a schematic circuit diagram for closing the cover, or masking member; and

Figure 6C is a second embodiment of the circuit diagram for the first reproduction apparatus;

As shown in Figure 1A, the surface of a drum 11 consists of a three-layered structure utilizing a CdS photoconductive body. The drum 11 is axially supported on a shaft 12 in a rotatable manner, and starts its rotation in the direction of an arrow 13 in accordance with a copying instruction.

When the drum 11 rotates to a predetermined position, an original image placed on a glass plate 14 for mounting the original image is illuminated by an illuminating lamp 16 integrally constructed with a first scanning mirror 15, the reflected light of which is scanned by the first scanning mirror 15 and a second scanning mirror 17. The first scanning mirror 15 and the second scanning mirror 17 move at a speed ratio of 1:½, whereby the image scanning can be done with the light path length in front of a lens 18 being always maintained constant.

After the reflected light image passes through the lens 18 and a third mirror 19, it is focussed on the drum 11 at an exposure section 21 through a fourth mirror 20.

The drum 11 is then charged (in "+", for example) by a primary charger 22, after which it is slit-exposed on its exposure section 21 with the image irradiated by the illuminating lamp 16.

At the same time, removal of electric charge in alternating current or in the opposite polarity to that of the primary electric charge (e.g. the negative polarity) is carried out by a charge removing means 23, thereafter an electrostatic latent image of a high image contrast is formed on the drum 11 by an overall exposure by an overall exposure lamp 24. The electrostatic latent image thus formed on the photosensitive drum 11 is then rendered visible by a developing means 25 as a toner image. Image transfer paper 27—1 or 27—2 within a cassette 26—1 or 26—2 is forwarded into the reproduction apparatus by means of a paper feeding roller 28—1 or 28—2, after which it is sent out in the direction of the photosensitive drum 11 with an approximate timing taken at a first register roller 29—1 or 29—2 and with the accurate timing taken at a second register roller 10.

Subsequently, while the image transfer paper 27 is passing between the image transfer charger 9 and the photosensitive drum 11, the toner image on the drum 11 is transferred onto the image transfer paper.

Upon completion of the image transfer operation, the image transfer paper is guided to a conveyor belt 8, and further guided to a pair of image-fixing rollers 7—1 and 7—2 where the image is fixed under pressure and heat, after which it is sent out into a tray 6.

The photosensitive drum 11 after the image transfer is cleaned its surface by means of a cleaning device 5 consisting of a resilient wiping blade so as to be ready for the subsequent reproduction cycle.

The reproduction apparatus shown in Figure 1A is capable of forming on the photosenstive drum 11 informations in the original image placed on the original mounting table 14 of glass in a reduced scale. In order to form such informations in a reduced scale, a position of the above-mentioned lens 18 is varied in accordance with a ratio for the scale reduction, and, at the same time, speeds of the first scanning mirror 15, the lamp 16, and the second scanning mirror are caused to vary. Since, however, such mechanism has already been well known, detailed explanations thereof will be dispensed with. For the detailed mechanism, reference should be made to U.S. Patent No. 3,614,222.

Figure 1B shows the top plan view of the reproduction apparatus shown in Figure 1A. It particularly shows the direction, in which the original image is placed on the original mounting table 14. That is to say, in the reproduction apparatus shown in Figure 1A, the original image is so placed that, in the case of its being in A—3 size (11.7 in. x 16.5 in.) and B—4 size (10.1 in.x14.3 in.), the lengthwise direction of the original image may coincide with the moving direction (x) of the optical system, and, in the case of A—4 size (8.3 in x 11.7in.) and B—5 size (7.2 in. x 10.1 in), the breadthwise direction of the original image may coincide with the moving direction of the optical system.

With such lay-out of the original image, when the one-to-one reproduction is to be carried out, the image transfer paper 27—1 in A—3 and B—4 size is so placed in the cassette 26—1 that the longitudinal direction of the paper 27—1 may coincide with the forwarding (feeding) direction F thereof as shown in Figure 2C—A, while the

image transfer paper 27—2 in A—4 and B—5 size is so placed in the cassette 26—2 that the breadthwise direction of the paper may coincide with the forwarding direction F thereof as shown in Figure 2C—B.

Thus, in the reproduction apparatus of a type, wherein the original image can be placed in both lengthwise and breadthwise directions thereof in order to accelerate the reproduction speed at the time of the one-to-one magnification reproduction, there may occur such a situation that the informations to be reproduced sprawls out of the image transfer paper at the time of the reproduction in reduced scale. For instance, when an origina image in A—3 size is to be reduced onto image transfer paper of A—4 size, or original image in A—3 size is to be reduced onto B—5 size paper, if the image transfer paper, on which the image informations in a reduced scale are to be transferred, is placed breadthwise as shown in Figure 2C—B, there will be transferred a reduced image of the informations in A—4 size on the image transfer paper in its lengthwise direction, whereby a part of the image informations will get off the image transfer paper.

In order therefore to avoid such inconvenience, the apparatus is so constructed that a cassette, in which even the image transfer paper in B—5 and A—4 size is placed in its lengthwise direction same as that shown in Figure 2C—A, is provided so that, when the original image in A—3 OR B—4 size is to be reduced to A—4 size, or the original image in B—4 size is to be reduced to B—5 size reproduction copy, a cassette, in which the transfer paper is placed lengthwise, may be used. In this way, satisfactory scale-reduction function is given to the reproduction apparatus without lowering the reproduction speed for the one-to-one magnification reproduction which is most frequently used.

In other words, the image transfer paper in same size conveyed through a paper feeding path within the reproduction apparatus is mutually different direction by 90 degrees in both cases of one-to-one reproduction and scale-reduced reproduction.

Figures 2A and 2B show further details of the operating panel 30—1 of the reproduction apparatus shown in Figure 1B, in which 31—1 refers to a dial for setting number of sheets of the reproduction copy, 32—1 denotes a copy button which instructs reproduction of the image in predetermined numbers of sheets, 33—1 designates a copy button which instructs a single sheet of reproduction copy irrespective of the set number of sheets of reproduction, 34 indicates a stop button which instructs stoppage of the reproduction operation, 35—1 is a density adjustment dial which adjusts density of an image to be formed on the image transfer paper, 36—1 and 37—1 designate respectively cassette instruction means, in which 36—1 is a button for instructing image transfer paper to be taken out of the cassette 26—1 loaded on the upper cassette mount of the reproduction apparatus in Figure 1A, and 37—1 is a button for instructing image transfer paper to be taken out of the cassette 26—2 loaded on the lower cassette mount of the reproduction apparatus in Figure 1A. The size of the image transfer paper accommodated in the cassette and to be selected by the button 36—1 or 37—1 is indicated at an indicator section 38—1.

At one portion of this operating panel, there is formed a recessed part 41, in which there are provided a plurality of scale-reduction operation buttons 40—1 to 40—5 as a manual selection means which instructs the shape of the image after the scale reduction, or as a means for designating the abovementioned image recording member, or as a means for limiting the magnification change. Thus, the buttons 40—1 to 40—5 possess the function of manual selection means which instructs the shape of the image to be recorded, the function of designating the image recording member, and the function of limiting a plurality of magnifications to any one of them. Over the recess 41, there is provided a slidable masking member 39 to cover the portion, thereby constituting the size-reduction operation section.

The masking or cover member 39 entirely covers the size-reduction operation buttons 40—1 to 40—5 as shown in Figure 2A to make them unable to be operated, or it slides back to expose these buttons outside so as to make them operable.

The masking member 39 may be made of transparent or semi-transparent glass or plastic material so that presence of the buttons 40—1 to 40—5 can be seen externally even when it covers the recessed portion entirely.

Figures 3A and 3B respectively show the details of the size-reduction operation section. In one part of a bottom plate 42 constituting the bottom part of the recess 41, there are disposed the above-mentioned size-reduction operating buttons 40—5 to 40—1 (the buttons 40—3 to 40—1 not being shown). On both sides of the bottom plate 42, there are disposed rails 43—1 and 43—2. Thus, the recess 41 is formed with this bottom plate 42 and the rails 43—1 and 43—2. At both sides of the masking or cover member 39, there are fixed angles 44—1 and 44—2 to hold the rails 43—1 and 43—2. The cover 39 can be moved in the arrowed direction S in a freely slidable manner along

the rails 43—1 and 43—2. On one part of the angles 44—1 and 44—2, there are fixedly provided pawls 45—1 and 45—2. Between these pawls 45—1 and 45—2 and a base plate (not shown), there are expanded springs 46 so that the cover 39 may always be energized in its closing direction (shown by an arrow T).

On one part of the rail 44—2, there is further provided a pawl 47. By moving the cover 39 in the direction opposite to the arrowed direction T to cause it to open, an arm 48 which rotatably held on a shaft 49 is rotated by this pawl 47 in the counter-clockwise direction against force of a spring 50

A lever 51 is integrally formed with the arm 48, the counter-clockwise rotation of which energizes an operating lever 53 of a micro-switch 52 to drive this microswitch 52 and lead out a signal therefrom. In other words, when the cover 39 is in its open state as shown in Figure 2B, the operating lever 53 of the switch 52 is depressed downward by the lever 51, whereby a contact *a* (not shown) is in contact with a contact piece *c* (also not shown). On the other hand when the cover 39 is in a state other than that shown in Figure 2B (e.g., a state as shown in Figure 2A), the operating lever 53 is not depressed downward, hence the contacts *a* and *c* are not in a state of mutual contact. 54 shows a damper, and 55 a projection fixed on one part of the rail 44—2. When the cover 39 is pulled by the spring 46 to its closing directions, it is closed gradually by the action of the damper 54 after the projection 55 and the damper 54 become contacted each other.

Although the cover 39 is constantly energized by the spring 46 in its closing direction as stated in the preceding, its open state is maintained by a click mechanism as shown in Figure 3B. That is, in one part of the angle 44—1, there is formed a circular through-hole 57, while, at one part of the rail 43—2, there is disposed a ball 59 energized in an arrowed direction W by a spring 58. In this way, a part of the ball 59 is pushed into the through-hole 57 upon opening of the cover 39 whereby the cover is able to maintain its open state as shown in Figure 3B against tensile force of the spring 46. For a mechanism to maintain the cover in its open state, there may also be used an electromagnet as shown in Figure 4A, which enables the cover to be closed under a certain particular condition of the reproduction apparatus. In more detail, a projected piece 60 made of metal material such as iron is fixedly provided at one end part of the cover 39, and an electromagnet 61 constructed with winding 63 wound around a core 62 disposed at the extreme end of the projected piece 60 at a position where it is located in the open state of the cover. The winding 63 is inserted in parallel with loads Z1 ... Zn constituting the reproduction apparatus with respect to a power source 64, as shown in Figure 4B, whereby, when a power source switch 65 to control operations of the reproduction apparatus is once turned off, the cover is drawn by the spring 46 to its closure state. Also, by the use of a circuit as shown in Figure 6B, it is possible to close the cover not only when the power source is turned off, but also when the copying operation does not start after lapse of a certain definite time interval with the cover being opened, or when the subsequent copying operation does not start even after lapse of a certain definite time interval upon completion of copying operation for a predetermined number of sheets with the cover being opened. The operations of the circuit shown in Figure 6B will be explained later.

In Figure 4A, those portions not illustrated in the drawing are the same as those shown in Figure 3A, and those portions having the same reference numerals consist of the same members in Figure 3A.

As described in the foregoing, since the size-reduction operation section is capable of informing its open and closure states by an output from the switch 52, a size-reduction instruction signal can be led out by opening the cover 39.

Figure 5 shows other embodiment of the size-reduction operation section, in which a cover 66 is provided so as to close a recessed portion 70, in which buttons 40 are accommodated. Arms 67 and 68 integrally formed with the cover 66 are held on a shaft 69 in a freely rotatable manner. When the cover 66 is opened, contact between the cover and a microswitch 71 is released, whereby a contact *a* and a contact piece *c* (both not shown) accommodated in the microswitch 71 become mutually contacted. When the cover 66 is closed, an operating lever of the microswitch 71 is depressed to release the contact between the contact *a* and the contact piece *c*, and a contact *b* and the contact piece *c* (both not shown) become contacted.

As stated in the preceding, a size-reduction signal can be led out by bringing the cover to its open state even by the microswitch 71 in the size-reduction operation section.

With such construction of the size-reduction operation section, it becomes possible to instruct change-over between the one-to-one reproduction and size-reduced reproduction by opening and closing of the cover of the size-reduction

operation section, i.e., at the time of the one-to-one reproduction operation, the size-reduction operation buttons 40—1 to 40—5 as the magnification change limiting means, which are not required to be manipulated, are shielded by the cover, whereby erroneous operation can be prevented, and desired copies can be made in exactly the same manner as in operating the conventional apparatus exclusive for the one-to-one reproduction, and, at the time of the size-reduced reproduction, the buttons are depressed for selecting the required size-reduction, whereby the opening operation of the cover is associated with selection of the size to be reproduced, i.e., one-to-one or size-reduction, hence the mechanism is easy to understand for the user as well as easy to operate.

Selection of a ratio of reduction at the time of size-reduction copying has heretofore been denoted mostly in terms of an area ratio of the reproduction copy with respect to the original image. The user, however, is only interested in the size of both original image and reproduction copy, and moreover the ratio of reduction is generally unfamiliar. Therefore, the apparatus is so designed that possible combinations between a size-reducible original image and reproduction copy are incorporated therein, and the user of the apparatus may simply depress any desired one of the size-reduction operation buttons (switches 40—1 to 40—5) as the image recording member designating means. In other words, at the time of the magnification change reproduction, the image recording member designating means is used for designating the image recording member which conforms to the shape of the image after magnification change, while, at the time of the one-to-one reproduction, only the cassette designating means is utilized. When any appropriate one of the operating buttons is depressed, an indicating lamp to clearly shows the depressed position is lit in the button. Since depression of this size-reduction operation button is the requisite condition for determining a position of the lens, etc. which decides the reduction ratio, if none of the size-reduction operation buttons is pushed, operation of the reproduction apparatus is inhibited so as to avoid erroneous copying, but the indicating lamps (for all size buttons) to show that the size-reduction operation button is pushed are turned on and off (or wink) to warn the operator against non-depression of any of the size-reduction operation buttons.

By designating the copy size through depression of the size-reduction operation button, the paper feeding cassette to be loaded in the reproduction apparatus must be conformed to the designated size. The relation between the direction of the original image for reproduction on the original mounting table and the forwarding for feeding direction of the copying paper is fairly complicated in comparison with the reproduction apparatus exclusively for the one-to-one reproduction. The present device therefore is designed in the following manner so that the operator may be prevented from possible confusion. First of all, the original image is placed in exactly same manner as in the case of the one-to-one reproduction. In this case, there occurs two situations, in which the image transfer sheet in the same size is forwarded in its lengthwise direction and in the breadthwise direction. In which direction the paper should be forwarded is determined by the reproduction apparatus, and the accurate cassette is indicated to the operator. That is to say, of the two cassettes loaded in both upper and lower cassette mounts, if a cassette size selected by one of the upper and lower cassette selection buttons as indicated by the lamp is not the right one for making copy of the designated size, another lamp winks to indicate the correct cassette size to be replaced, and, at the same time, a warning lamp 75 indicating "USE WINKING CASSETTE SIZE" winks on the abovementioned operating panel 30—1. During this period, the reproduction apparatus does not work at all, even if the copy button 32—1 or 33—1 are depressed. When the correct cassette is loaded by change-over of the upper and lower cassette selection button or replacement of the cassette, the winking and warning by the lamp extinguish and the copying operation starts. According to this embodiment, winking of the lamp is used as the warning indication. It is also effective to use any warning sound or change in color for each lamp so as to draw attention of the operator.

Besides the above, when the reduced size and the paper size in the cassette are not conformed, it is permissible to depress the size-reduction operation button corresponding to the paper size as selected.

As stated in the foregoing, the reproduction apparatus does not necessitate the operator's judgement. Only if the adequate measures are taken in accordance with the instructions from the reproduction apparatus, correct copies as desired can be obtained. Thus, in place of the conventional operating mechanism which has been complicated and difficult to operate, there is now provided one which is easy to understand and operate.

Preferred forms of control circuit for operating the apparatus of Figures 1 to 5 will now be described in detail.

Figure 6A shows a first embodiment of

the control circuit. In the drawing SW1 corresponds to the size selection (one-to-one or size-reduction) switch 52 to be actuated by the abovementioned cover for determining the size of the reproduction copy (one-to-one or size-reduction). SW2 to SW6 are switches to be actuated by the size-reduction selection buttons 40—1 to 40—5 in Figure 2B, wherein SW2 instructs size-reduction from A—3 to B—4, SW3 from A—3 to A—4, SW4 from B—4 to A—4, SW5 from B—4 to B—5, and SW6 from A—4 to B—5, respectively. SW7 is a switch to be actuated by the cassette selection buttons 36 and 37 in Figure 2A, contacts 1 and 3 of which are connected by depression of the button 36, and contacts 3 and 2 of which are connected by depression of the button 37. SW8 and SW9 are switches that are actuated by a cam plate of the cassette (not shown). These switches serve for detecting whether the cassettes are loaded in the apparatus or not, and they are turned on when the cassettes are loaded therein. SW10 to SW16 are switches that are actuated by the cam plate of the cassette. They serve to detect the size of the cassette. The following Table 1 shows on-and-off states of the switches when various sizes of the cassettes are loaded in the appparatus.

TABLE 1

Switches / Size of cassette	SW8	SW10	SW11	SW12	cassette loaded in the upper level
	SW9	SW13	SW14	SW15	cassette loaded in the lower level
A—3 (lengthwise)	ON	ON	ON	ON	
A—4 (breadthwise)	ON	OFF	ON	ON	
B—4 (lengthwise)	ON	ON	OFF	ON	
B—5 (breadthwise)	ON	OFF	OFF	ON	
U—1 (universal cassette)	ON	ON	ON	OFF	
U—2 (universal cassette)	ON	OFF	ON	OFF	
A—4 (lengthwise)	ON	ON	OFF	OFF	
B—5 (lengthwise)	ON	OFF	OFF	OFF	

In the above Table 1, the universal cassettes U—1 and U—2 are such type of cassette that can feed various sizes of reproduction paper, the details of whch appear in U.S. Patent No. 4,032,136. The universal cassette U—1 is for large-sized paper, which can accommodate paper of the maximum size of 11 in. x 17 in., while the universal cassette U—2 is for small-sized paper, which can accommodate therein the reproduction paper of the maximum size of 8.5 in. x 11 in.

In Figure 6A, PL1 and PL2 are respectively lamps for indicating "one-to-one" and "size-reduction", PL3 to PL9 are lamps for indicating the size of the cassette, in which PL3 indicates the cassette for lengthwise feeding of A—3 size paper, PL4 indicates the cassette for breadthwise feeding of A—4 size paper, PL5 the cassette for lengthwise feeding of B—4 size paper, PL6 the cassette for breadthwise feeding of B—5 size paper, PL7 the universal cassette U—1 for large-size paper, PL8 the universal cassette U—2 for small-sized paper, PL9 the cassette for lengthwise feeding of A—4 size paper, and PL10 the cassette for lengthwise feeding of B—5 size paper. Also, a lamp PL11 instructs replacement of the cassette, and a lamp PL12 notifies the operator to inspect the cassette.

T3 to T10 are respectively terminals for leading out a paper size signal into a control circuit CC. The control circuit CC is also applied with an input signal from a terminal T13 which produces an output signal to prohibit the reproduction operation, and another input signal showing that to which one of a plurality of magnification change modes (e.g. A—4 to B—5 change) it is limited, or the one-to-one mode is selected. In this control circuit CC, there are carried out various controls corresponding to multitude of magnification change modes, i.e., one-to-one A—3, one-to-one B—4, one-to-one A—4, one-to-one B—5, A—3 to B—4 magnification change, A—3 to A—4 magnification change, and B—4 to B—5 magnification change. The control circuit CC produces a high tension transformer and a main motor driving signal output from a terminal 01, a paper feeding solenoid signal output from a terminal 02, an optical system forwarding and exposure lamp signal output from a terminal 03, an optical system reversing signal output from a terminal 04, and a lens system driving signal output from a terminal 05, thereby controlling the reproduction apparatus with a timing and sequence corresponding to each mode. Since control of the reproduction apparatus with a sequence corresponding to a paper size signal, and so forth has been well

known, no detailed explanations will be given herein. (Reference should be had to U.S. Patent No. 3,804,514 for details.)

D1 to D10 denote diodes for preventing electric current from intrusion, LD1 to LD5 indicate light emitting diodes for indicating whether the size-reduction buttons are depressed, or not, R1 to R33 refer to resistors, C1 designates a capacitor, Tr1 to Tr13 are transistors, Ic1 to Ic6 are inverters, Ic7 refers to a voltage comparator (product of Mitsubishi Electric Co., Japan, Type M51201L) incorporating therein a Schmitt trigger circuit, the input and output of which are in the same phase, Ic8 to Ic11 denote AND gates, Ic12 to Ic14 are latches (e.g. SN7475 of Texas Instruments Inc., U.S.A.), Ic15 designates a NAND gate, Ic16 refers to a decoder for converting a binary decimal code to a decimal code (e.g. SN7442 of Texas Instruments Inc., U.S.A.), Ic17 to Ic20 are inverters, Ic21 and Ic22 are NAND gates, Ic23 to Ic26 are AND gates, Ic27 is a NOR gate, Ic28 to Ic45 denote NAND gates, Ic46 refers to an inverter, and IC47 designates a NAND gate.

Now, the operations of the circuit shown in Figure 6A will be given hereinbelow. At first, one-to-one copying operation will be described. When the cover 39 of the size-reduction operation section is in a closed state, the contacts 1 and 3 of the switch SW1 are in a conductive state, hence the lamp PL1 is turned on to indicate that the reproduction operation is to be done in the one-to-one. Also, since the contacts 2 and 3 of the switch SW1 are open, and input at each input terminal 1 of the inverters Ic1 to Ic6 is at the level of logic "1" (hereinafter referred to as H), while an output at each output terminal 2 of the inverters Ic1 to Ic6 is at a level of logic "0" (hereinafter referred to as L). Since the inputs into the data input terminals D1 to D4 of the latch Ic12 and the data input terminals D1 and D2 of the latch Ic13 are all at the level L, the outputs from the output terminals Q1 to Q4 of the latch Ic12 and the output terminals Q1 and Q2 of the latch Ic13 are all at the level L. On the other hand, the outputs from the output terminals $\overline{Q1}$ to $\overline{Q4}$ of the latch Ic12 and the output terminals $\overline{Q1}$ and $\overline{Q2}$ of the latch Ic13 are all at the level H. Since input terminals 1 and 2 of the NAND gate Ic15 is connected to the output terminals $\overline{Q3}$ and $\overline{Q4}$ of the latch Ic12, the output from the output terminal 3 is at the level L, as the result of which the input at the input terminal 1 of the AND gate IC23 is at the level L, and the output from the output terminal 3 of the AND gate Ic23 is also at the level L. Next, since the input at the input terminal 1 of the AND gate IC24 is connected to the output terminal Q2 of the latch Ic12, the input takes the level L, hence the output from the output terminal 3 of the AND gate Ic24 also takes the level L. Further, since the input at the input terminal 1 of the AND gate Ic25 is connected to the output terminal Q2 of the latch Ic13, the input at the input terminal 1 of the AND gate Ic24 takes the level L. hence the output from the output terminal 3 of the AND gate Ic24 takss the level L. Furthermore, since the input at the input terminal 1 of the AND gate Ic26 is connected to the output terminal Q1 of the latch Ic13, the input into the AND gate Ic26 takes the level L, hence the output from the output terminal 3 thereof also takes the level L. Moreover, since the inputs at the input terminals 1 to 4 of the NOR gate Ic27 are respectively connected to the output terminals of the AND gates Ic23 to 26, all the inputs take the level L, while the output from the output terminal 5 takes the level H. Also, the input terminal 1 of the NAND gate Ic22 is connected to the output terminal Q1 of the latch Ic12, the input into the NAND gate Ic22 takes the level L, hence the output from the output terminal 7 thereof takes the level H. Next, since the input terminals 2 of the NAND gates Ic29 to Ic33 are respectively connected to the output terminals $\overline{Q2}$ to $\overline{Q4}$ of the latch Ic12 and the output Q1 and Q2 of the latch Ic13, the inputs of the NAND gates Ic29 to Ic33 are all at the level L, hence the outputs from the respective output terminals 3 are all at the level H. Now assume that, in this condition, an A—3 size cassette is loaded on the upper cassette mount, a B—4 size cassette is loaded on the lower cassette mount, and the upper-and-lower cassette changeover switch SW7 is turned to the side of the upper cassette. In this case, the contacts 1 and 3 of the switch SW7 is in a conductive state. Since the upper cassette mount is loaded with the A—3 size cassette, the switches SW10 to SW12 are in the conductive states according to Table 1 shown in the foregoing. Accordingly, the inputs into the input terminals 1 of the AND gates Ic8 to Ic11 are all at the level H, and the outputs from the output terminals 3 of the AND gates Ic8 to Ic11 are all at the level L, hence the inputs into the input terminals D1 to D3 of the latch Ic14 are all at the level L, and the outputs from the output terminals Q1 to Q3 thereof are all at the level L. In this consequence, all the inputs at the input terminals A, B, C, and D of the decoder Ic16 take the level L, and the output of the output terminal 0 thereof is at the level L, while the outputs from the other output terminals 1 to 7 thereof are all at the level H. As the result, the input of the input terminal 2 of the NAND gate Ic36

connected to the output terminal 0 of the decoder Ic16 takes the level L, and the output from the output terminal 3 thereof drives the base of the transistor Tr4 which, in turn, actuates the lamp PL3 to indicate that the cassette is in the A—3 size. Incidentally, since the input terminals 1 and 2 of the NAND gate Ic21 are respectively connected to the output terminals 6 and 7 of the decoder Ic16, both inputs are at the level H and the outputs from the output terminals 3 thereof are at the level L. Accordingly, the inputs of the NAND gates Ic28 and Ic34 connected to the output terminals 3 of the NAND gate IC21 also take the level L, and the output thereof takes the level H. From the above, since the inputs of the NAND gates Ic37 to Ic44 are all at the level H, the outputs from the NAND gates Ic37 to Ic44 are all at the level L, whereby the transistors Tr5 to Tr12 are in the off-state, and the lamps PL4 to PL11 are not turned on. Also, to the input terminal of the NAND gate Ic45, there is connected the output terminal 3 of the AND gate Ic11 through the inverter Ic46, hence its input is at the level H. Also, to the input terminal 2 of the NAND gate Ic45, there is applied a signal from other circuit (not shown), which is a paper detection signal to indicate presence or absence of the image transfer paper within the cassette, through the terminal T2. Accordingly, if this paper detection signal is at the level H, which indicates that the paper is present in the cassette, the output from the NAND gate Ic45 takes the level L, whereby the transistor Tr13 is turned off and the lamp PL12 does not light. Conversely, if this paper detection signal is at the level L, the lamp PL12 is turned on to urge inspection of the cassette. In case the upper cassette mount is selected, wherein no cassette is present, or conversely, the lower cassette mount is selected, wherein no cassette is present, or neither of the cassette mount is selected, nor the cassette is present in either cassette mount, the output from the output terminal 3 of the AND gate Ic11 is at the level L, whereby the output from the inverter Ic46 takes the level L, the output from the NAND gate Ic45 takes the level H, and the transistor Tr13 is turned on to light up the lamp PL12 for inspection of the cassette. Thus, when the lamp PL12 is turned on, the level of the terminal T12 takes the level L, and the input at the input terminal 2 of the NAND gate Ic47 also takes the level L, hence the output from the output terminal 3 of the NAND gate Ic47 takes the level H, and a signal to prohibit reproduction operation is transmitted from the terminal T13 to the control circuit CC of the reproduction apparatus, whereby the reproduction operation is prohibited. In this way, the terminal T13 prohibits the reproduction operation same as a jam detection signal does. Next, when the cassette selection button 37 is depressed to set the lower cassette mount, by which the B—4 size cassette is selected, the contacts 2 and 3 of the switch SW7 become contacted, and the input at the input terminal A of the decoder Ic16 takes the level L, the input terminal B thereof takes the level H, the input terminal C thereof the level L, and the terminal D thereof the level L according to the above-mentioned Table 1, as is the case with the abovementioned A—3 size cassette, whereby the output from the output terminal 2 of the decoder Ic16 takes the level L, while the other outputs are at the level H. In this consequence, the lamp PL5 is turned on to indicate that the cassette is in the B—4 size. In the same manner, by inserting the other size of the cassette into the inserting port of the cassette mount and selecting a desired cassette through depression of the button 36 or 37, there will be indicated the desired size of the cassette as selected. In this state, when the abovementioned copy button 32 or 33 is depressed, the image transfer paper is fed out of the designated cassette, and the reproduction of the original image is carried out in the sequence of feeding of the image transfer paper. Now assume that the cassette in A—4(R) size for the size-reduction reproduction is inserted into the inserting port of the cassette mount ((R) denotes the lengthwise forwarding of the paper), and this cassette is selected by the button 36 or 37. Same as in the abovementioned case, the input at the input terminal A of the decoder Ic16 is at the level L in accordance with Table 1 above, the input of the input terminal B is at the level H, the input of the input terminal C is at the level H, and the input of the input terminal D is at the level L, whereby the output from the output terminal 6 of the decoder Ic16 takes the level L and the outputs from the other output terminals are all at the level H. In this consequence, the lamp PL9 is turned on. At the same time, since the output from the output terminal 6 of the decoder Ic16 is at the level L, the input at the input terminal 1 of the NAND gate Ic21 also takes the level L, whereby the output from the NAND gate Ic21 is at the level H, and the input at the input terminals 2 of the NAND gate Ic28 is also at the level H. Further, since the input at the input terminal 1 of the NAND gate Ic28 is connected to the collector of the transistor Tr1, the transistor Tr1 constitutes an oscillating circuit with the Schmitt trigger Ic7, the resistor 6, and the capacit C1, and the output from the transistor Tr1 continuously repeats its on-off operations at a certain definite cycle, the input

at the input terminal 1 of the NAND gate Ic28 alternately changes its level between H and L, whereby the output from the output terminal 4 thereof also repeats the alternate changes in the level between H and L. As the result, the inputs at the input terminals 1 of the NAND gates Ic36 to Ic41 repeat the alternate level changing between H and L, whereby the lamps PL3 and PL8 turn on and off. In addition, since the output from the NAND gates Ic21 is at the level H, the input at the input terminal 1 of the NAND gate Ic34 is also at the level H, whereby the output from the NAND gate Ic34 is at the level L and the input at the input terminal 1 of the NAND gate Ic44 is also at the level L. Thus, the transistor Tr12 is actuated and the lamp PL11 is lit. In this way, when the A—4 cassette in the lengthwise forwarding A—4(R) is set and so selected for the one-to-one copying, the lamp PL9 to indicate presence of the A—4(R) cassette is lit to indicate selection of the A—4(R). At the same time, the lamps PL3 to PL8 to indicate the cassettes for the one-to-one copying are turned on and off, and the lamp PL11 to instruct replacement of the cassette is turned on to warn and instruct the operator for the subsequent operations. In the same manner, when a cassette B—5(R) is set and so selected, the lamp PL10 is lit, and the lamps PL3 to PL8 are turned on and off, while the lamp PL11 is turned on to warn and instruct the operator to take the subsequent operations. When the lamp PL11 is turned on, the level of the terminal T11 is at L, and the input at the input terminal 1 of the NAND gate Ic47 takes the level L, whereby the output from the output terminal 3 thereof is at the level H, and a signal to prohibit the reproduction operation is transmitted from the terminal T13 to control circuit CC of the reproduction apparatus to prohibit the reproduction operation.

In the following the operations for the size-reduction copying will be explained. The operator of the reproduction apparatus, when he wants to make a size-reduction reproduction, first opens the cover as shown in Figure 2B. By opening the cover, the switch 52 (SW1) is changed over to bring the contacts 2 and 3 of the switch SW1 into mutual contact, whereby the lamp PL2 is turned on to indicate that the apparatus is in the size-reduction copying mode. Now assume that, under such situation, the size-reduction selection button (from A—3 to A—4 size) is depressed, and the A—3 size cassette is selected by the button 36 or 37. In this case, the switch SW3—1 becomes conductive to cause electric current to flow through the light emitting-diode LD2, whereby the diode emits light to indicate that the size-reduction from A—3 to A—4 size has been instructed. Simultaneously, as the contacts 2 and 3 of the switch SW1 and the switch SW3—1 become also conductive, the inputs at the input terminals 1 of the inverters IC1 and IC3 take the level L, and the outputs from the output terminals 2 of the respective inverters take the level H. At this time, the inputs of the inverters IC2, IC4, IC5, and IC6 are all at the level H, because the switches SW2—1, SW4—1, SW5—1, and SW6—1 are open. Accordingly, the inputs at the input terminals D1, D2, D3, and D4 of the latch IC12 respectively take the levels H, L, H, and L, the inputs at the input terminals D1 and D2 of the latch IC13 respectively take the levels L and L, the outputs from the output terminals (Q1, $\bar{Q}1$), (Q2 $\bar{Q}2$), (Q3, $\bar{Q}3$), and (Q4, $\bar{Q}4$) respectively take the levels (H, L), (L, H), (H, L), and (L, H), and the outputs from the outputs terminals (Q1, $\bar{Q}1$) and (Q2, $\bar{Q}2$) of the latch IC13 respectively take the levels (L, H) and (L, H). Also, since the A—3 size cassette is selected, the output from the output terminal 0 of the decoder IC16 is at the level L, while the outputs from the other output terminals 1 to 7 thereof are at the level H.

As mentioned above, since the input terminals 1 and 2 of the NAND gate IC15 are respectively connected to the output terminals $\bar{Q}3$ and $\bar{Q}4$ of the NAND gate IC12, and the outputs from them are all at the level H, the output from the output terminal 3 of the NAND gate IC15 is at the level L, whereby the input at the input terminal 1 of the AND gate IC23 is also at the level L, and the output from the output terminal 3 thereof is also at the level L. Although the input terminal 2 of the AND gate IC24 is connected to the output terminal 2 of the decoder IC16 through the inverter IC18, as the output from the output terminal 2 of the decoder IC16 is at the level H, the input at the input terminal 2 of the AND gate IC24 takes the level L and the output from the output terminal 3 thereof also takes the level L. Since the input at the input terminal 1 of the AND gate IC25 is connected to the output Q2 of the latch IC13, its level is at L, and the output of this gate is also at the level L. Also, as the input terminal 1 of the AND gate IC26 is connected to the output Q1 of the latch IC13, its input is at the level L, and the output thereof is also at the level L. Accordingly, the inputs at the input terminals 1 to 4 of the NOR gate IC27 with the outputs from the AND gates IC23 to IC26 as the inputs thereto are all at the level L, and the output from the output terminal 5 of this NOR gate IC27 is at the

level H. The input at the input terminal 3 of the NAND gate IC22 is connected to the output terminal $\overline{Q3}$ of the latch IC12, hence its level is L, and the output from the output terminal 7 of the gate is at the level H. The input terminal 1 of the NAND gate IC35 is connected to the output terminal 7 of the NAND gate IC22, the input terminal 2 thereof is connected to the output terminal 5 of the NOR gate IC27, and the input terminal 3 thereof to the output terminal Q1 of the latch IC12, the input levels of which are all at H, hence the output from the output terminal 4 of this NAND gate IC35 is at the level L. Further, as the output terminal 4 of this NAND gaze IC35 is connected to the input terminal 2 of the NAND gate IC44, the output from this gate IC44 causes electric current to flow into the base of the transistor Tr12 to turn it on, whereby the lamp PL11 is lit. Since input terminal 1 of the NAND gate IC21 is connected to the output terminals 6 and 7 of the decoder IC16, the output from the output terminal 3 thereof is at the level L, hence the input at the input terminal 2 of the NAND gate IC28 is also at the level L, and the output from the output terminal 4 thereof is at the level H. Moreover, since the input terminal 2 of the NAND gate IC30 is connected to the output terminal Q3 of the latch IC12, its input is at the level H, while the input at the input terminal 1 thereof is connected to the collector of the transistor Tr1 which produces outputs at the levels H and L alternatively, the output from the output terminal 3 of the NAND gate IC30 also repeats the levels H and L alternately. Furthermore, since the input at the input terminal 2 of the NAND gate IC42 is connected to the output terminal 3 of the NAND gate IC31, and the input terminal 3 thereof is connected to the output terminal 6 of the decoder IC16, the inputs at both input terminals 3 and 2 of the NAND gate IC42 are all at the level H, and, since the input terminal 1 thereof is connected to the output terminal 3 of the NAND gate IC30, the input at this terminal alternately repeats the level H and L, whereby the output from the output terminal 4 of the NAND gate IC42 causes electric current to flow intermittently into the base of the transistor Tr10 to turn on and off the lamp PL9. As stated in the foregoing, since the A—3 size cassette has been selected, the output from the output terminal 0 of the decoder IC16 is at the level L, and the input at the input terminal 2 of the NAND gate IC36 is also at the level L, hence the output from the output terminal 3 of the NAND gate IC36 causes electric current to flow into the base of the transistor Tr4 to turn it on, and the lamp PL3 is lit.

From the above-described operations, it will be clearly understood that, if an inadequate A—3 size cassette has been selected in spite of the size-reduction copying from A—3 to A—4 size having been selected, the lamp PL3 to indicate the A—3 size is lit, manifesting that the A—3 size cassette has been selected at present. At the same time, the lamp PL9 to indicate the A—4(R) cassette to be selected is turned on and off, and the lamp PL11 to instruct replacement of the cassette is further lit to warn the operator to replace the cassette with that in A—4(R) size. As soon as the cassette is changed to the A—4(R) size, the output from the output terminal 6 of the decoder IC16 takes the level L, and the other outputs are all at the level H, whereby the lamp PL9 is turned on and the lamps PL3 and PL11 do not light up. In the same manner, when the size-reduction in other different size has been selected, and an adequate cassette is selected, the cassette size alone is indicated on the lamp; however, if an inadequate cassette is selected, the cassette size as selected is indicated along with the adequate cassette size being indicated by turning on and off of the relevant lamp, and the lamp PL11 to instruct the cassette replacement is lit to warn the operator to that effect, and the reproduction operation is simultaneously prohibited.

In the following, explanations will be given as to a case, wherein the cover 39 for changeover between one-to-one reproduction and size-reduction reproduction is open, and no size-reduction selection button (40—1 to 40—5) is depressed. In this case, since none of the size-reduction selection buttons is depressed, the switches SW2—1, SW3—1, SW4—1, SW5—1, and SW6—1 are all open, and the switches SW2—2, SW3—2, SW4—2, SW5—2, and SW6—2, are all closed. (It is to be noted that the switches having a sub-number —1 and the switches having a sub-number —2 are mutually associated in their on-and-off state being just opposute.) Also, since the cover is open, the contacts 2 and 3 of the switch SW1 are conductive, hence the input at the input terminal 1 of the inverter IC1 is at the level L and the output from the output terminal Q1 thereof is also at the level L. In this consequence, the transistor Tr2, the base of which is connected to the output terminal $\overline{Q1}$ of the latch IC12 through the resistor R14, become "off", and electric current flows alternately in the base of the transistor Tr3 from the resistor R8 connected to the collector of the transistor Tr1 through the resistor R15, whereby the transistor Tr3 repeats the on-and-off operations. Accordingly, electric current flows alternately in the light emitting diodes LD1

to LD5 through the resistors R1 to R5, the diodes D6 to D10, the switches SW2—2, SW3—2, SW4—2, SW5—2, and SW6—2, and the collector of the transistor Tr3, whereby the light emitting diodes LD1 to LD5 are turned on and off to warn the operator against non-depression of the size-reduction selection buttons. When the cover 39 is closed, the output from the output terminal $\bar{Q}1$ of the latch IC12 is at the level H, hence the transistor Tr2 is "on", and the transistor Tr3 is "off", whereby the light emitting diodes LD1 to LD5 are extinguished, even if the size-reduction selection button is not depressed. In the foregoing explanations, it is described that the latches IC12 to IC14 send out all the data input D thereinto as the outputs therefrom. However, these latches are so constructed that these data inputs D may be latched as they are, since during execution of the copying operation by the reproduction apparatus, the outputs Q and $\bar{Q}$ do not change even when the data inputs D vary. Since this is not directly related to the present invention, no further detailed explanation will be given herein. To sum up, these latches are for preventing various inconveniences from taking place by the changes in the positions of the optical lens, optical mirror, etc. and the exposure area of the original image during the reproduction operation, since they are all controlled by a size-reduction signal and a cassette size signal.

Figure 6B shows a cover closing circuit to be used when the power source is turned off, or when no copying operation is started after lapse of a certain definite time with the cover being opened, or when no subsequent copying operation is started after lapse of a certain definite time upon completion of reproduction of predetermined numbers of the copy sheets with the cover being opened. The operation of this cover closing circuit is such that, when the above-mentioned cover is opened, the contacts 2 and 3 of the switch SW1 become conductive, and the input of the inverter Ic101 takes the level L, and the output thereof takes the level H. (It should be understood that the terminal T101 is connected to the contact 2 of the switch SW1 in the circuit shown in Figure 6A.) Then, the transistor Tr101 is turned on and the capacitor C102 discharges, whereby ⊖ terminal of the operational amplifier OP101 takes the level L and the output thereof takes the level H. As the result, the transistor Tr102 is turned on through the resistor R108 and the zener diode ZD101 to energize an electromagnet 61', whereby the cover is maintained in its open state. In this state, however, if the copying operation is not started, the transistor Tr101 is turned off after lapse of a predetermined time by a time constant circuit composed of the resistor R101 and the capacitor C101. Subsequently, when the capacitor C102 is charged via resistor R105 the ⊖ input terminal of the operational amplifier OP101 takes a level higher than that of the ⊕ input terminal of operational amplifier OP101, and the output thereof takes the level L. As the result, the transistor Tr102 is turned off, the electromagnet 61' is deenergized to render the cover in its closed state, the contacts 1 and 3 of the switch SW1 become conductive, and the one-to-one copying mode control means is selected.

Upon opening of the cover, when the copying operation is started, the base input of the transistor Tr101 takes the level H and the transistor Tr101 is turned on, because a high tension transformer and main motor signal has been led out of the above-mentioned terminal 01. In this consequence, the transistor Tr102 is also turned on and the electromagnet 61' is energized, whereby the cover is maintained in its open state. When copying of predetermined numbers of sheets has been accomplished, the abovementioned high tension transformer and main motor signal takes the level L, whereby the transistor Tr101 is turned off and the capacitor C102 begins to be charged through the resistor R105 with the consequence that the ⊖ input terminal of the operational amplifier OP101 takes a level higher than that of the ⊕ input terminal thereof, and the output thereof takes the level L. Thus, the transistor Tr102 becomes "off", and the electromagnet 61' is de-energized to bring the cover to its closed state, the contacts 1 and 3 of the switch SW1 become conductive, and the one-to-one copying mode control means is thereby selected. Also in case the power source is turned off, the electromagnet 61' is naturally de-energized, and the cover is brought to its closed state.

Figure 6C shows the second embodiment of the circuit for the first reproduction apparatus. The circuit in Figure 6C is so constructed that, when any one of the size-reduction operational buttons is depressed, designating a desired size-reduction reproduction, if the image recording member corresponding to the designated size-reduction mode is present as the result of searching both upper and lower cassette mounts within the reproduction apparatus for such appropriate image recording member, the recording member as detected is fed into the reproduction apparatus from the position as it is found out.

In the circuit of Figure 6C, those parts designated by the same reference numerals and symbols as in Figure 6A are understood to have the same functions as those in

Figure 6A. In this circuit construction, Ic14a refers to a latch having the same function as the latch Ic14 in Figure 6A, but detects only the upper cassette size. Similarly, Ic14b is a latch to detect the lower cassette size alone. Ic16a designates a decoder having the same function as the decoder Ic16 in Figure 6A, but produces an output signal for the upper cassette size alone. Similarly, Ic16b refers to a decoder to produce an output signal for the lower cassette size alone. Ic201 denotes an AND gete Ic202 to Ic227 are inhibiting AND gates, Ic229 to Ic 232 are OR gates, and Ic233 to Ic245 are NOR gates.

The operations of the circuit in this Figure 6C will now be explained hereinbelow. When the one-to-one recording is designated, the cover is closed and the selection of the image recording member by the image recording member designating means is prohibited, and selection of the upper and lower cassette is performed. When the upper cassette is selected, the contacts 1 and 3 of the switch SW7' become conductive, and a cassette size signal from the decoder Ic16a is selected, whereby any one of the lamps PL3 to PL10 is turned on to indicate presence of the designated cassette. In this case, if the cassette of A—4 (lengthwise forwarding) or B—5 (lengthwise forwarding) is accommodated in the upper cassette mount, the lamps PL3 to PL8 are all turned on and off, and the lamp PL11 is turned on to instruct replacement of the cassette for any one, for which the lamps are turned on and off. Simultaneously with this, the copying operation is prohibited by the control circuit CC. If, for example, the cassette of A—4 size (breadthwide forwarding) is loaded on the upper cassette mount and the copying operation is carried out in this state, an upper cassette selection signal output is produced from the output terminal 06 and the copying operation is performed. Control of the reproduction apparatus is as mentioned above. The same holds good when the lower cassette is selected.

The following explanations are for a case, wherein the size-reduction reproduction is selected. When the size-reduction from A—3 to B—4 size is selected out of the image recording member designating means, the switch SW2—1 becomes conductive, and the output from the output terminal Q2 of the latch Ic12 takes the level H. If the B—4 size cassette is loaded either in the upper cassette mount or in the lower cassette mount, the lamp PL4 which indicates the B—4 size is turned on. When the B—4 size cassette is loaded in the lower cassette mount, a lower cassette signal output is produced from the OR gate Ic232 and transmitted to the control circuit CC. If the B—4 size cassette is loaded neither in the upper cassette mount, nor in the lower cassette mount, the lamp PL5 is turned on and off, and the lamp PL11 is turned on to instruct the operator to load the B—4 size cassette in either the upper or the lower cassette mount, while prohibiting the copying operation. When the size-reduction has been selected, selection of the upper and lower cassette by the switch SW7' is inhibited. When the cassette is loaded in neither the upper cassette mount, nor the lower cassette mount, the lamp PL12 is turned on to urge inspection of the cassette, and prohibit the copying operation. The same holds good when no image transfer paper is in the cassette in the upper and lower cassettes.

As stated above, when the desired size of the cassette is found to be loaded in any one of the upper and lower cassette mounts as the result of searching for such desired cassette in both upper and lower cassette mounts at the time of the size-reduction designation by the use of the circuit shown in Figure 6C, the copying operation can be performed straightforwardly, the operator need not inspect the cassette size in the upper and lower cassette mounts. In this embodiment, two cassette mounts are seen to be provided in the reproduction apparatus, although the number can be increased as desired, whereby simpler selection of the cassette becomes feasible. In the present embodiment, also, the upper and lower cassettes are searched only at the time of the size-reduction designation. However, if the recording image size is designated in real size, i.e. one-to-one recording, and a signal representative of such recording image size is produced, or the size of the original image is automatically detected, the image recording medium cassette accommodating the appropriate size medium can be selected by comparing the signal so produced with the cassette size signal representing the cassette size in the upper or lower cassette mounts.

In the above described embodiments, the shape of the recording image is designated by the selective operation, by the operator, of the operating buttons. The size of the original to be copied is also assessed by the operator and the selection between the operating buttons made in accordance with the result of such assessment. It is also possible to detect the shape of the original automatically by means, for example, of an assembly of an infra red light source arranged to project infra red light upwardly through the original support plate, and a plurality of infra red detectors carried by and appropriately positioned on the original keep plate 101—1 (see Figure 1). The outputs of the detectors will depend upon the size and position of the original, and

more particularly will depend upon which of the detectors are masked by the original. Circuitry can be provided to process the outputs of the detectors to identify and indicate the original size. An indication of the recording image size can be derived. For example in the real size copying mode this size indication will provide directly a designation of the recording image size. A determination can be made of coincidence or non-coincidence between the recording image size and the recording medium size. Non-coincidence can be visually indicated and, if required, copying can be inhibited in response thereto.

In all of the above described embodiments of the present invention, the image recording member is accommodated in a cassette. However, the invention is also applicable to apparatus of a type, in which the image of the original is transferred onto a sheet of paper cut out from a roll of copy paper.

Furthermore, it will be clear that the size of the recording image can be designated by actuation of manual means or determined by direct detection of the original size. Thus, in a facsimile image or a reproduction apparatus capable of changing the image magnification, if the shape of the recording image can be automatically detected, such image shape can be notified by the detected signal. In addition, the fact that the image shape does not conform to the image recording member and, further, an adequate image recording member conforming to the original image shape can be notified, and the image recording operation prohibited when the original image size does not conform to the image recording member.

Reference is hereby directed to co-pending Patent Application No. 14776/78 [Serial No 1604457] from which this present application is divided and also to co-pending Patent Application No. 8100865 [Serial No. 1604459] which is also divided from Application 14776/78 [Serial No 1604457].

WHAT WE CLAIM IS:—

1. A copying or printing apparatus comprising:

image forming means selectively operable in a real size copying mode and a plurality of modified size copying modes to form on a recording medium an image of an original to be copied;

first manually operable means by which selection may be made between the real size copying mode and alternatively the modified size copying modes and

second manually operable means for the selection of one of said modified size copying modes; said second manually operable means being arranged to be disabled, whereby modified size copying mode selection is inhibited, in response to the selection, by operation of said first manually operable means, of said real size copying mode.

2. An apparatus according to claim 1 in which there is provided a masking member arranged to mask the second manually operable means by inhibiting access thereto while the real size copying mode is selected.

3. An apparatus according to claim 2 wherein said first manually operable means comprises said masking member, and wherein said masking member is arranged to be placed selectively in a masking condition in which the real size copying mode is selected, and an unmasking condition in which the modified size copying modes are selected and the second manually operable means are enabled.

4. An apparatus according to any preceding claim wherein means is provided for terminating a state of selection of said modified size copying modes, at a predetermined timing.

5. An apparatus according to claim 4 wherein the predetermined timing is the time at which power to the apparatus is turned off.

6. An apparatus according to claim 4 wherein the predetermined timing is the time of elapse of a predetermined period which follows completion of an image forming operation of said image forming means in a modified size copying mode, and during which no further image forming operation in a modified size copying mode commences.

7. An apparatus according to claim 4, or any claim dependent thereon, when dependent on claim 3 wherein said terminating means is arranged to cause said masking member to adopt said masking condition at said predetermined timing.

8. An apparatus according to claim 2 or any claim dependent thereon wherein said masking member includes a portion of light transmissive material through which the second manually operable means is visible when masked by said masking member.

R. G. C. JENKINS & CO.,
Chartered Patent Agents,
53/64 Chancery Lane,
London WC2A 1QU
Agents for the Applicants.

Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1981
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1604458 COMPLETE SPECIFICATION
15 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG. 1A

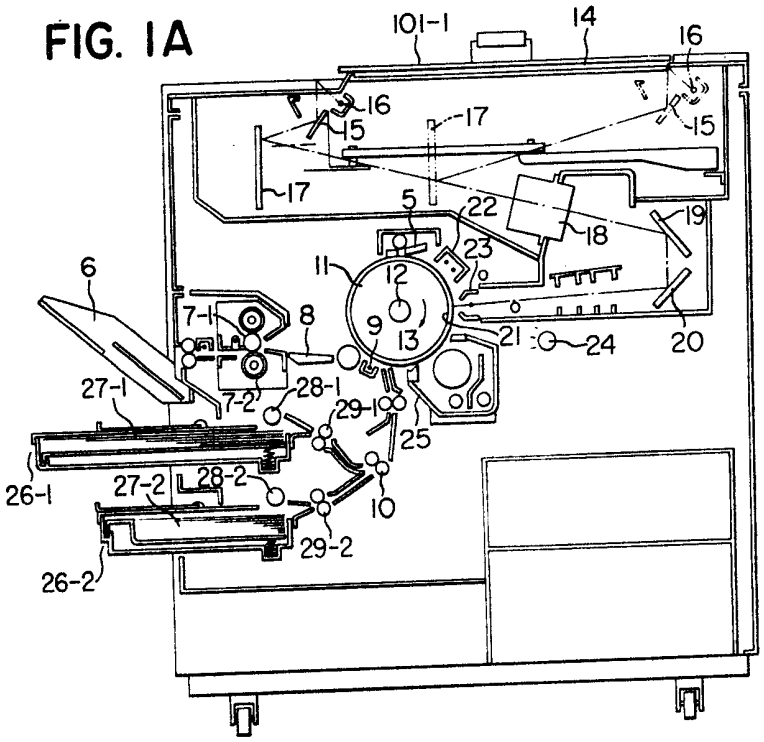
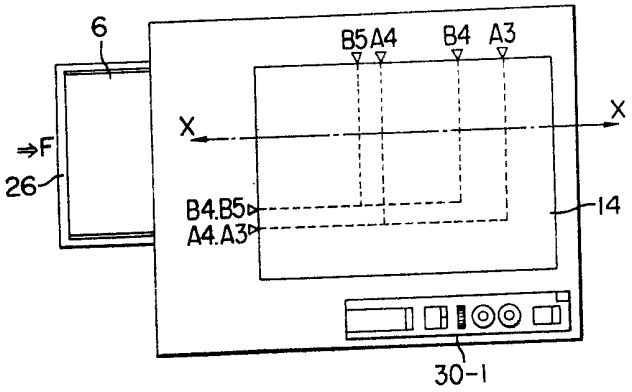


FIG. 1B



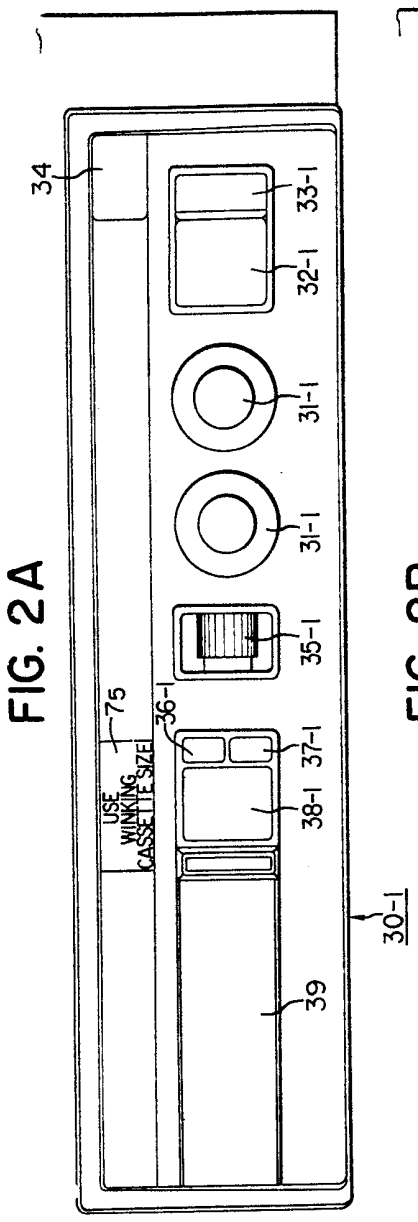

34
33-1
32-1
31-1
31-1
35-1
75
36-1
37-1
38-1
USE WINKING CASSETTE SIZE
39
30-1

FIG. 2A

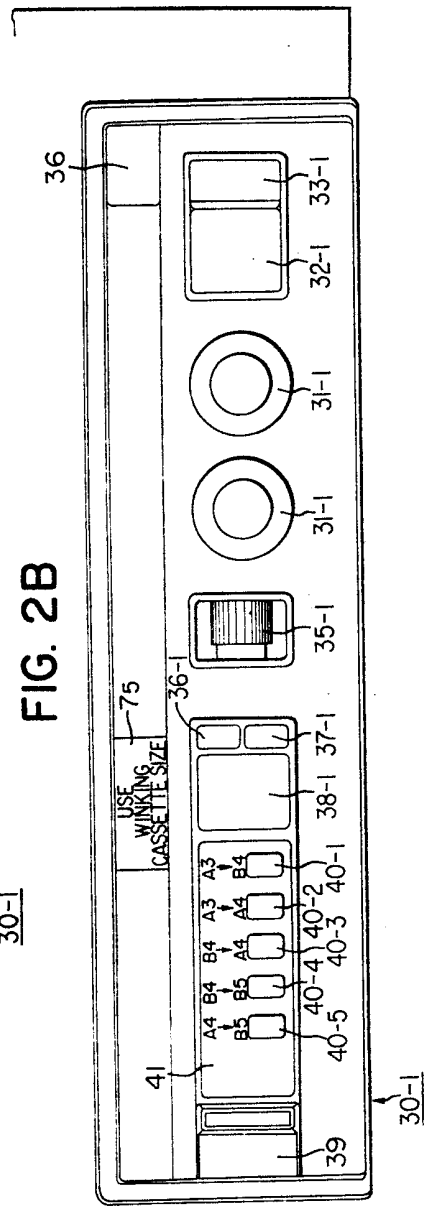

36
33-1
32-1
31-1
31-1
35-1
75
36-1
37-1
38-1
USE WINKING CASSETTE SIZE
A3 B4
A3 A4
B4 A4
B4 B5
A4 B5
40-1
40-2
40-3
40-4
40-5
41
39
30-1

FIG. 2B

FIG. 2C-A

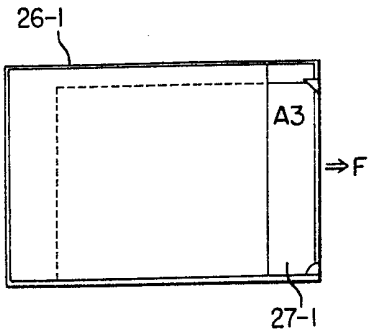


FIG. 2C-B

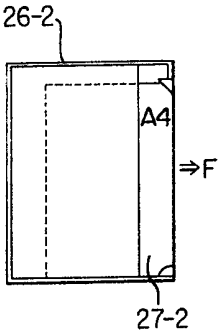


FIG. 4B

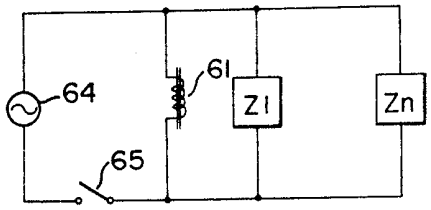
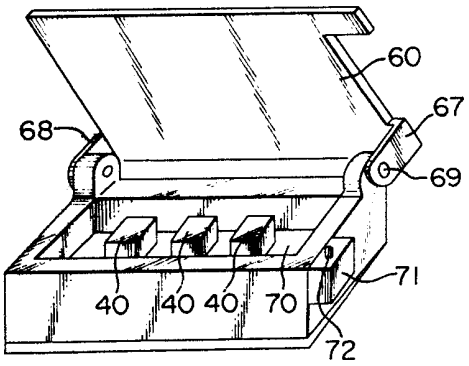
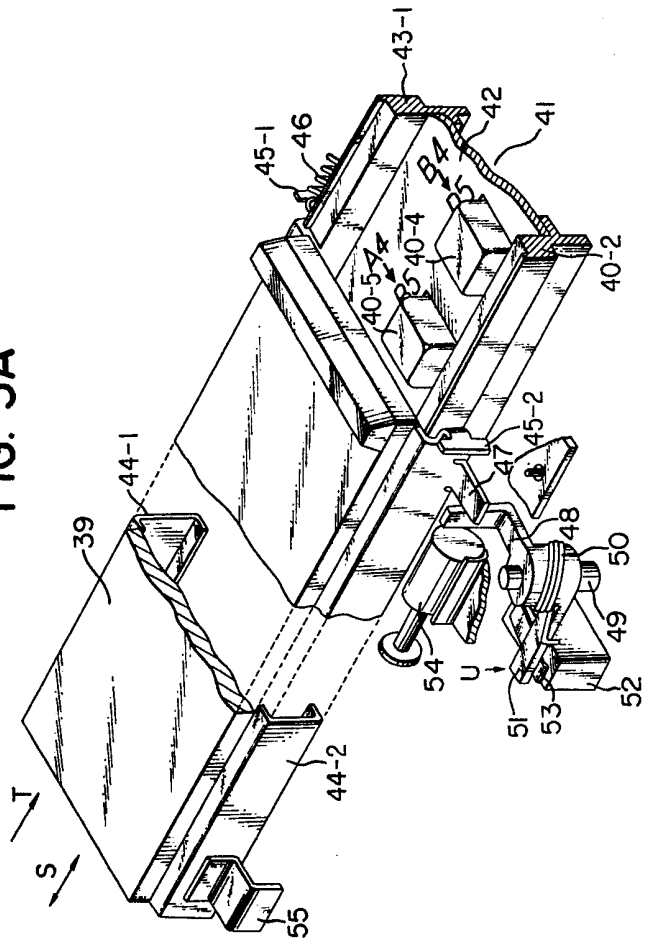


FIG. 5



1604458 COMPLETE SPECIFICATION
15 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 4

FIG. 3A



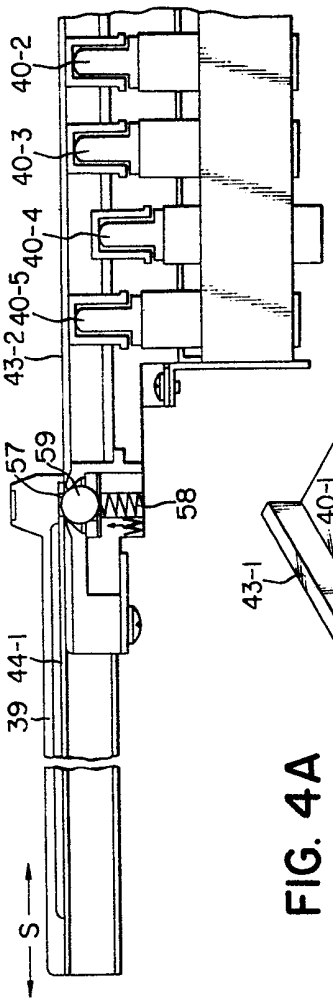

40-2
40-3
40-4
40-5
43-2
57
59
58
44-1
39
S

FIG. 3B

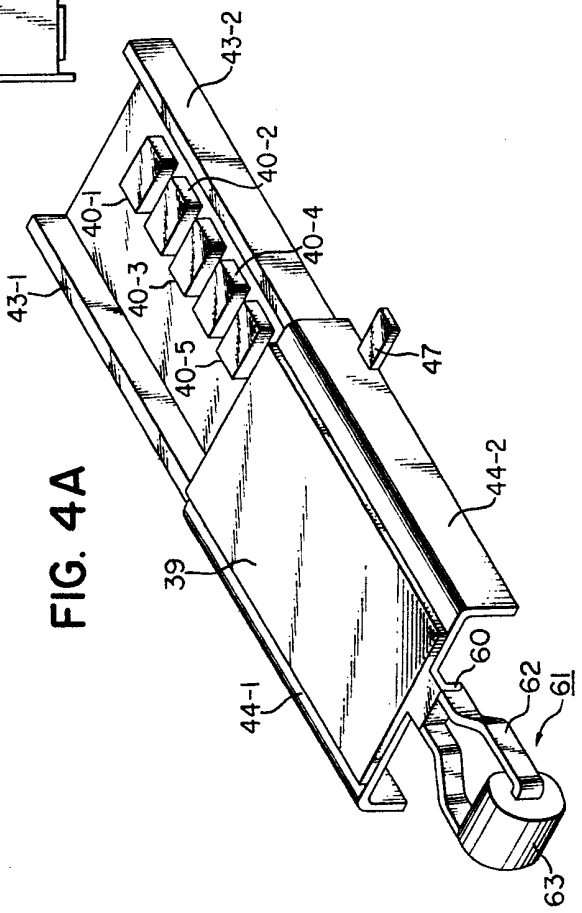

43-2
40-2
40-1
40-4
40-3
43-1
40-5
47
44-2
39
60
62
61
44-1
63

FIG. 4A

FIG. 6A1

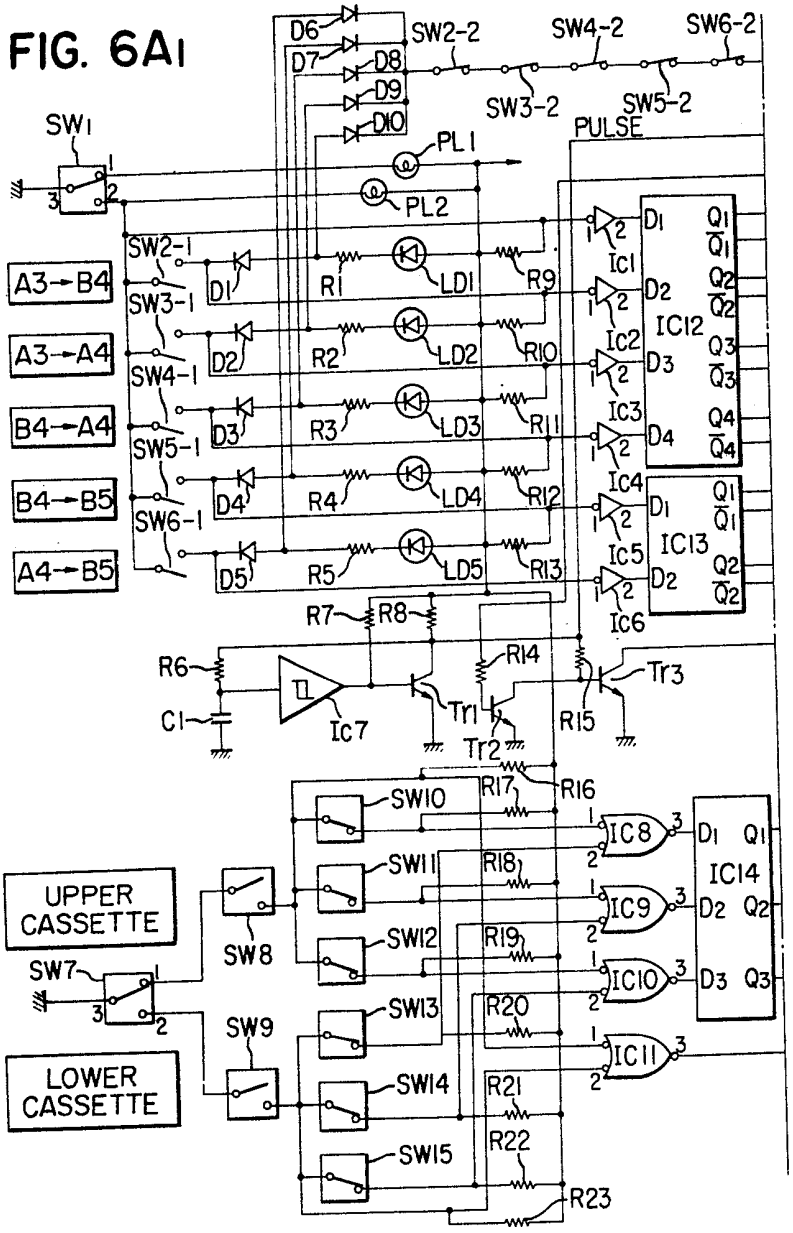
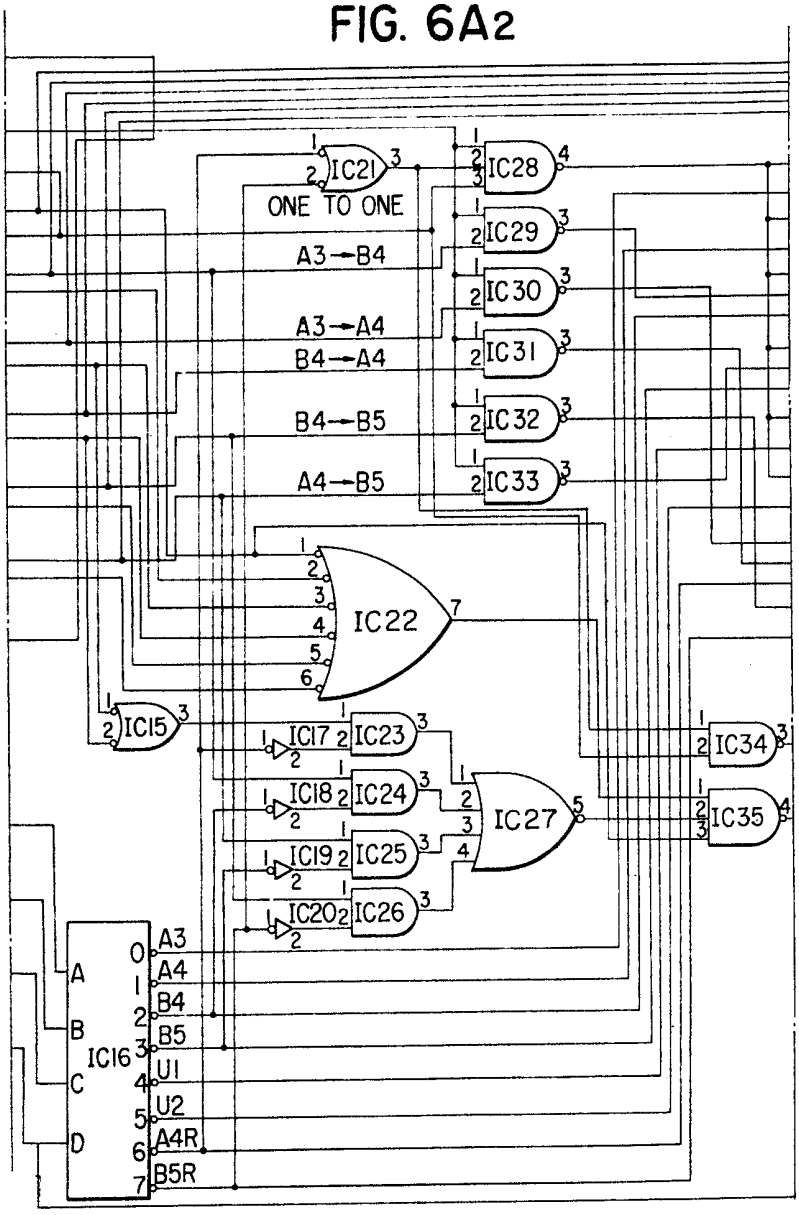

D6
D7
D8
D9
D10
SW2-2
SW4-2
SW6-2
SW3-2
SW5-2
PULSE
SW1
PL1
PL2
A3→B4
A3→A4
B4→A4
B4→B5
A4→B5
SW2-1
SW3-1
SW4-1
SW5-1
SW6-1
D1
D2
D3
D4
D5
R1
R2
R3
R4
R5
LD1
LD2
LD3
LD4
LD5
R9
R10
R11
R12
R13
IC1
IC2
IC3
IC4
IC5
IC6
IC12
IC13
D1
D2
D3
D4
Q1
Q2
Q3
Q4
R6
R7
R8
R14
R15
C1
IC7
Tr1
Tr2
Tr3
SW10
SW11
SW12
SW13
SW14
SW15
R16
R17
R18
R19
R20
R21
R22
R23
IC8
IC9
IC10
IC11
IC14
UPPER CASSETTE
LOWER CASSETTE
SW7
SW8
SW9

FIG. 6A2



R.G.C. JENKINS & CO.
AGENTS.

FIG. 6A3

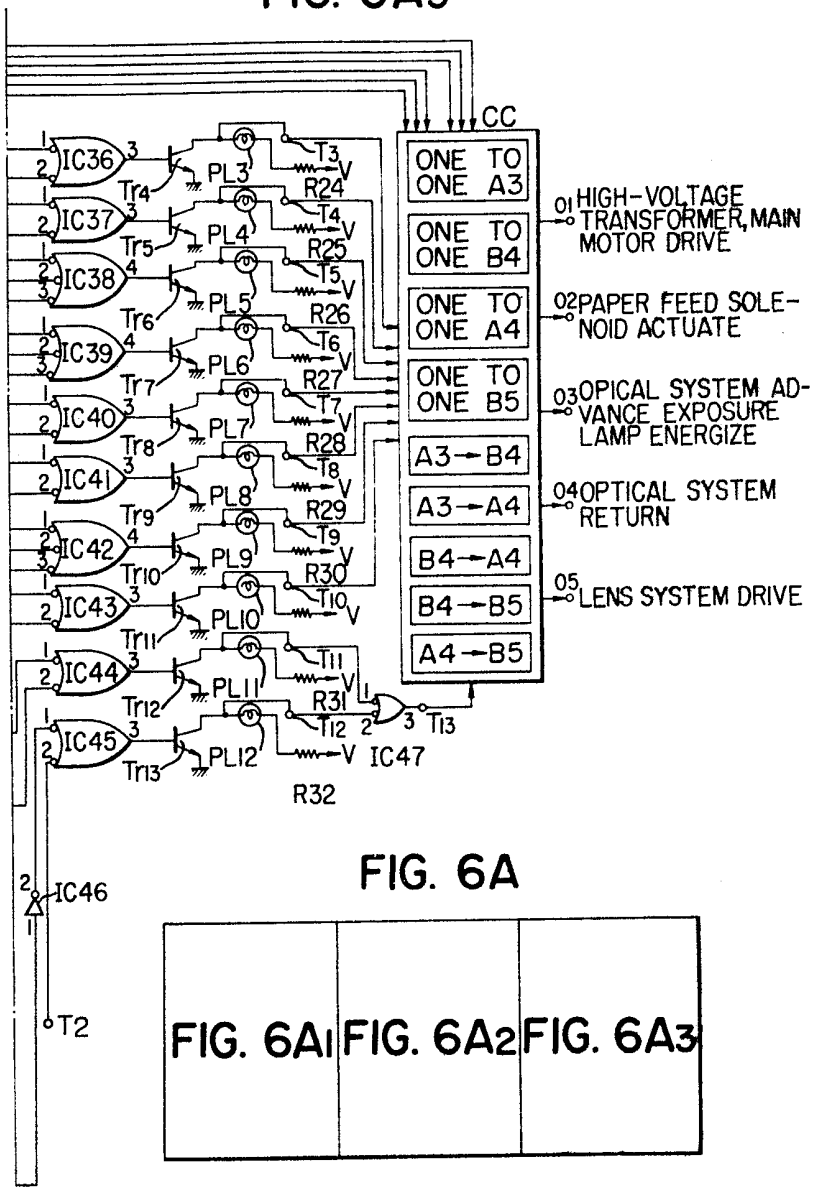


FIG. 6A

FIG. 6A1	FIG. 6A2	FIG. 6A3

FIG. 6B

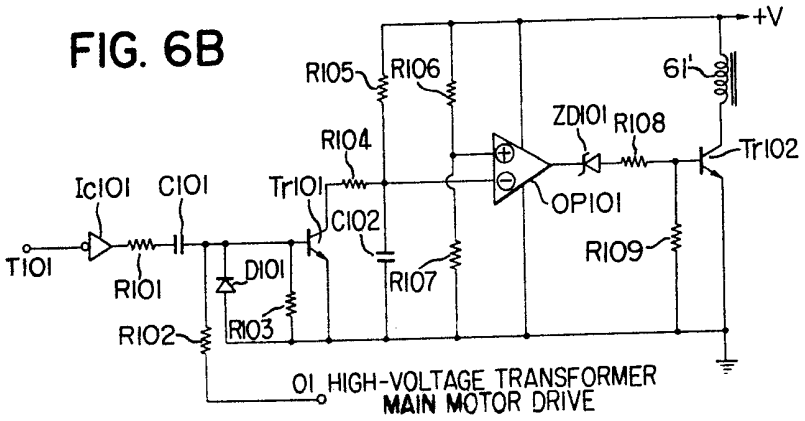
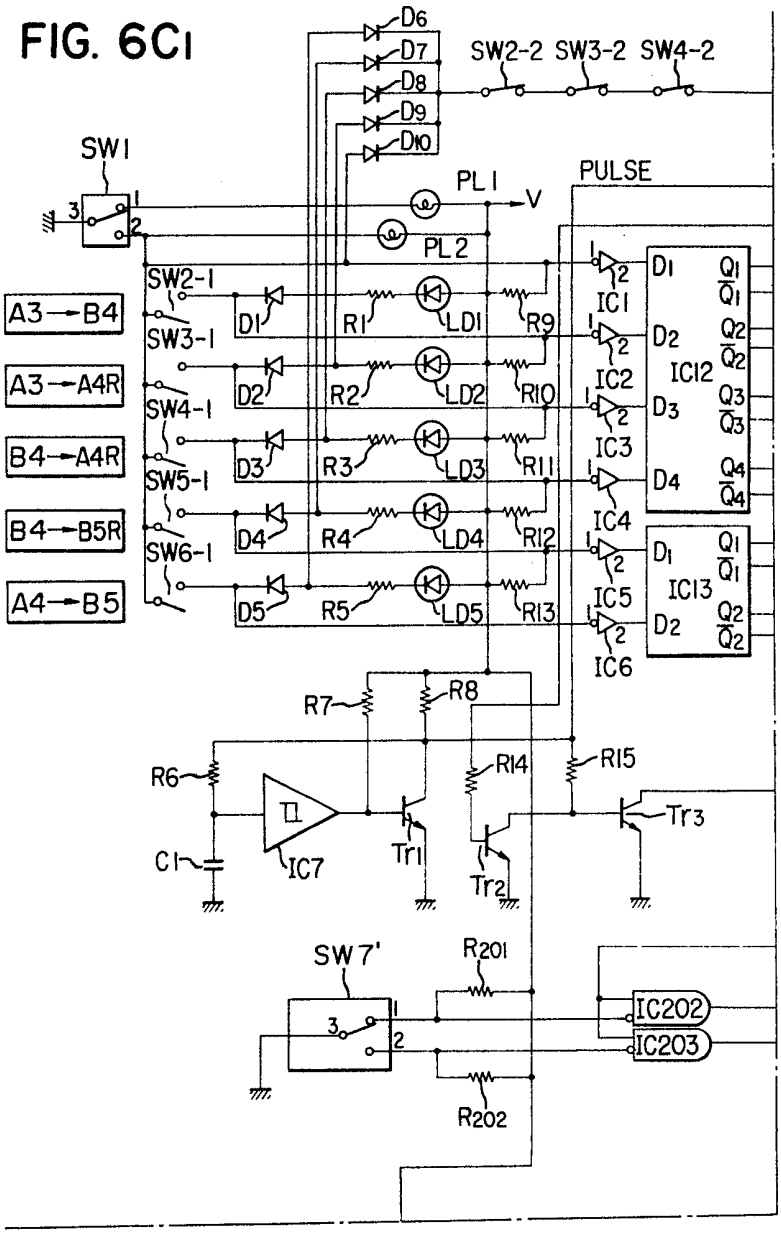

+V
R105
R106
61'
ZD101
R108
R104
Tr102
IC101
C101
Tr101
C102
OP101
T101
R101
D101
R107
R109
R103
R102
01 HIGH-VOLTAGE TRANSFORMER
MAIN MOTOR DRIVE

FIG. 6C1



R.G. C. JENKINS & CO.
AGENTS.

FIG. 6C2

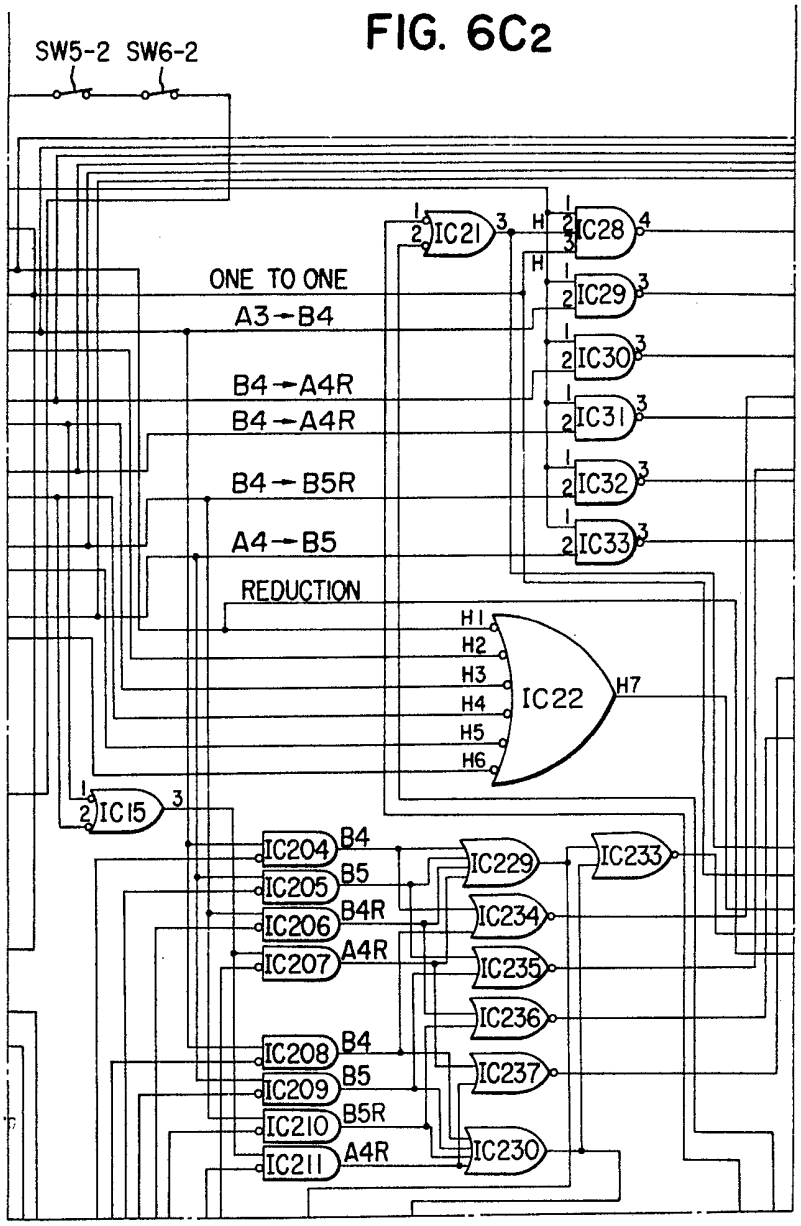

SW5-2
SW6-2
IC21
IC28
IC29
IC30
IC31
IC32
IC33
ONE TO ONE
A3→B4
B4→A4R
B4→A4R
B4→B5R
A4→B5
REDUCTION
H1
H2
H3
H4
H5
H6
IC22
H7
IC15
IC204
IC205
IC206
IC207
IC208
IC209
IC210
IC211
B4
B5
B4R
A4R
B4
B5
B5R
A4R
IC229
IC234
IC235
IC236
IC237
IC230
IC233

FIG. 6C3

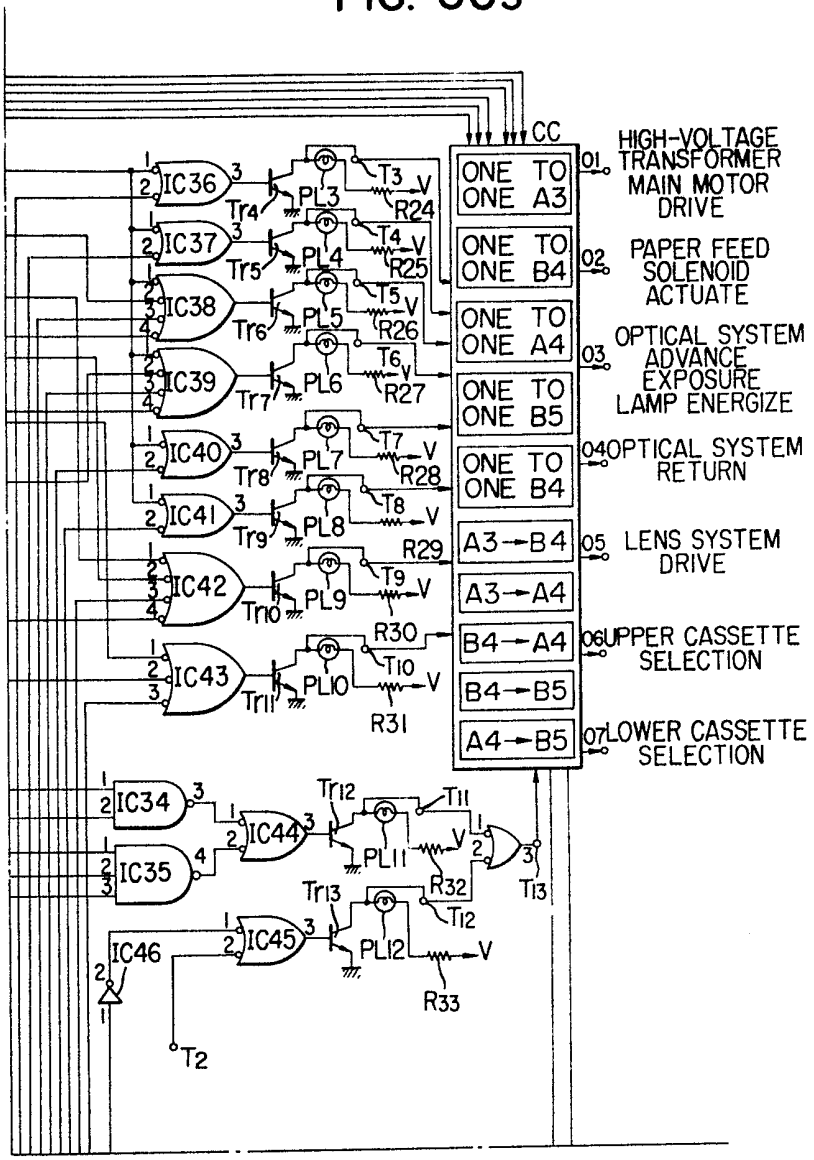

CC
ONE TO ONE A3
ONE TO ONE B4
ONE TO ONE A4
ONE TO ONE B5
ONE TO ONE B4
A3→B4
A3→A4
B4→A4
B4→B5
A4→B5
01 HIGH-VOLTAGE TRANSFORMER MAIN MOTOR DRIVE
02 PAPER FEED SOLENOID ACTUATE
03 OPTICAL SYSTEM ADVANCE EXPOSURE LAMP ENERGIZE
04 OPTICAL SYSTEM RETURN
05 LENS SYSTEM DRIVE
06 UPPER CASSETTE SELECTION
07 LOWER CASSETTE SELECTION
IC36
IC37
IC38
IC39
IC40
IC41
IC42
IC43
IC34
IC35
IC44
IC45
IC46
Tr4
Tr5
Tr6
Tr7
Tr8
Tr9
Tr10
Tr11
Tr12
Tr13
PL3
PL4
PL5
PL6
PL7
PL8
PL9
PL10
PL11
PL12
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T2
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
V

FIG. 6C4

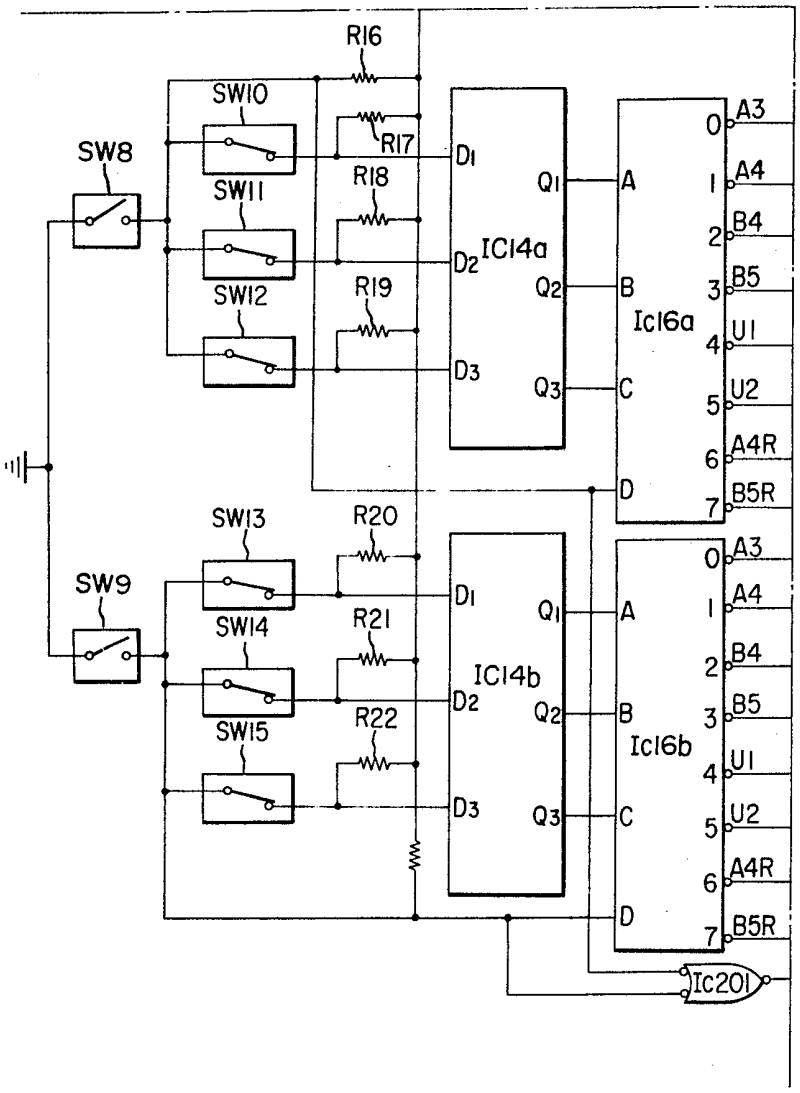

R16
SW10
SW8
R17
D1
Q1
A
A3
SW11
R18
D2
IC14a
Q2
B
IC16a
B4
SW12
R19
D3
Q3
C
U1
U2
A4R
D
B5R
SW13
R20
SW9
SW14
R21
IC14b
IC16b
SW15
R22
Ic201

FIG. 6C5

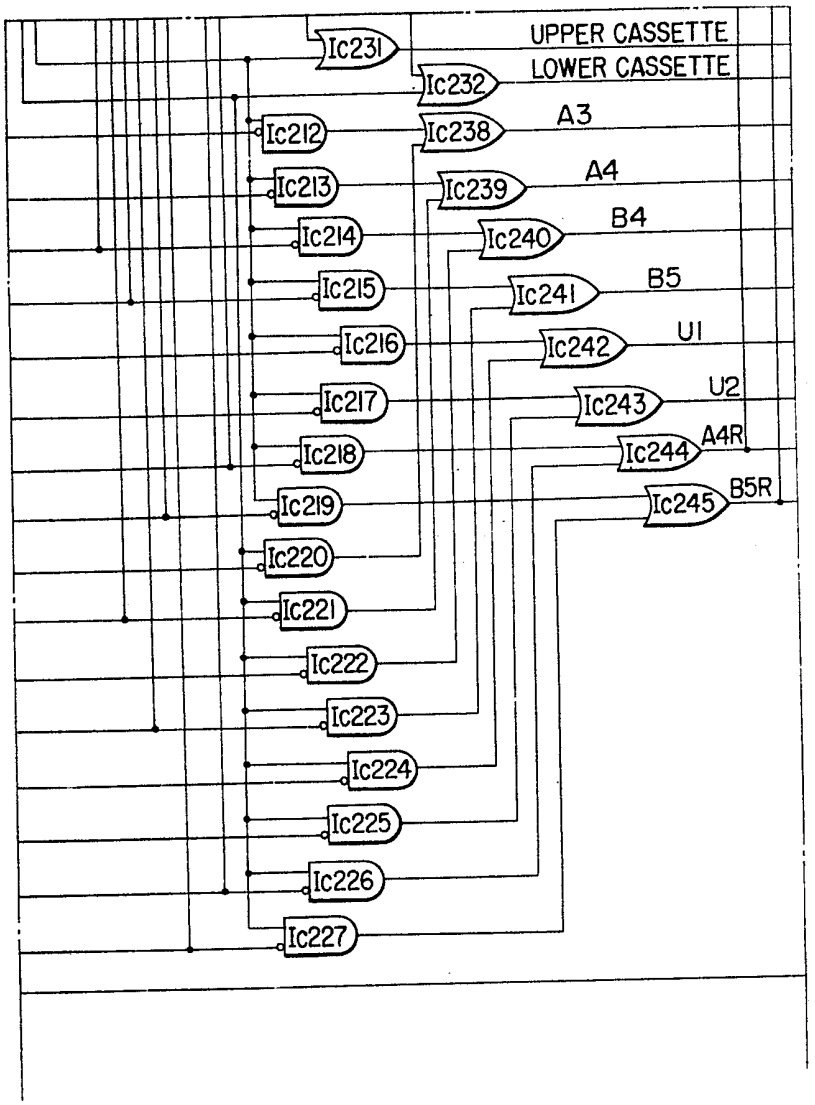

Ic231
UPPER CASSETTE
Ic232
LOWER CASSETTE
Ic212
Ic238
A3
Ic213
Ic239
A4
Ic214
Ic240
B4
Ic215
Ic241
B5
Ic216
Ic242
U1
Ic217
Ic243
U2
Ic218
Ic244
A4R
Ic219
Ic245
B5R
Ic220
Ic221
Ic222
Ic223
Ic224
Ic225
Ic226
Ic227

FIG. 6C6

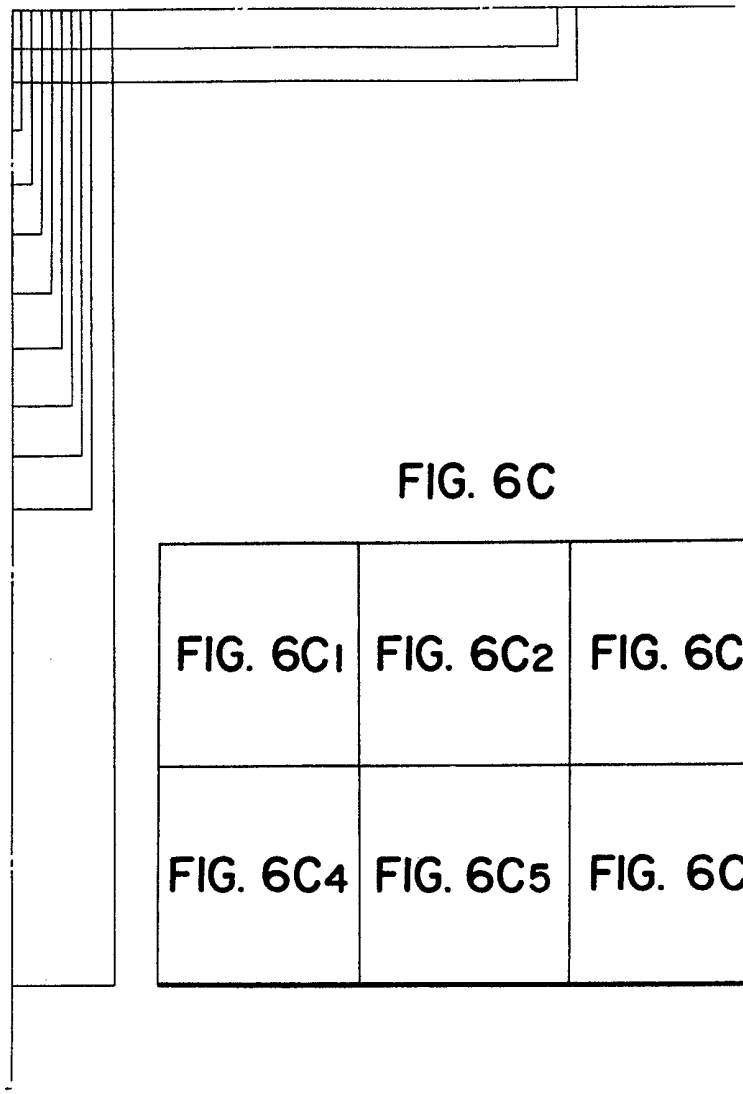


FIG. 6C

FIG. 6C1	FIG. 6C2	FIG. 6C3
FIG. 6C4	FIG. 6C5	FIG. 6C6